

The opinion in support of the decision being entered today was ***not*** written for publication and is ***not*** binding precedent of the Board.

Paper No. 27

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RICHARD W. WENSEL

Appeal No. 2003-1501
Application 09/756,929

HEARD: November 5, 2003

Before KIMLIN, WARREN and OWENS, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

Decision on Appeal

This is an appeal under 35 U.S.C. § 134 from the decision of the examiner finally rejecting claims 1 through 20 and 43 through 62. Appellant cancelled claims 1 through 20 subsequent to the final rejection, leaving claims 43 through 62 for our consideration on appeal. Claims 43, 47 and 53¹ are illustrative of the claims on appeal:

43. An apparatus for removing contaminants from one or more component surfaces of an encapsulated object, the apparatus comprising:

an encapsulated object:

an enclosure for housing an encapsulated object; and

¹ We reproduce these claims as they stand of record, including the last clause of appealed claim 47 (“of gas” and “and an electric field”). See the amendment of April 12, 2002 (Paper No. 9).

a source of plasma gas, coupled to said enclosure, for exposing the encapsulated object in said enclosure to plasma gas;

wherein a reaction of the plasma gas at a component surface of the encapsulated object causes any contaminants thereon to be removed from the component surface of the encapsulated object.

47. A plasma cleaner comprising:

an encapsulated electronic component:

a reaction chamber;

a gas source coupled to said reaction chamber;

an electric field source coupled to said reaction chamber; and

a vacuum pump coupled to said reaction chamber, wherein said vacuum pump maintains vacuum pressure in said reaction chamber and removes by-products produced from reaction on a surface of the encapsulated electronic component of gas, which is supplied to said reaction chamber by said gas source, and an electric field, which is supplied to said reaction chamber by said source of electric field.

53. A manufacturing apparatus for treating and curing electronic packages, the apparatus comprising:

a plurality of electronic packages;

a process unit in which the electronic packages are disposed for treatment and curing;

a gas source, coupled to said process unit, for introducing gas into said process unit;

an energy field generator supplying an energy field inside said process unit, to cause within said process unit the gas to produce a plasma which reacts on conductive surfaces of the electronic packages to remove encasing material and contaminants therefrom; and

a heat source providing heat inside said process unit to cure the electronic packages.

The appealed claims, as represented by the above claims, are drawn to apparatus for plasma cleaning and can include curing a workpiece, which can be an encapsulated object or an electronic package, by exposing the workpiece to plasma gas in a reaction chamber, that is also termed an enclosure or a processing unit.

The references relied on by the examiner are:

Ito et al. (Ito)	4,486,461	Dec. 4, 1984
Rigali et al. (Rigali)	5,766,404	Jun. 16, 1998

The examiner has rejected appealed claims 43, 44, 46 through 52, 58 and 59 under 35 U.S.C. § 102(e) as being anticipated by Rigali (answer, page 5), and appealed claims 45,

53 through 57 and 60 through 62 under 35 U.S.C. § 103(a) as being unpatentable over Rigali in view of Ito (answer, page 6).

Appellant groups the claims into four groups for purposes of appeal, wherein the claims in each group stand or fall together, with the four groups represented by claims 43, 47, 53 and 56, respectively (brief, page 5). With respect to appealed claim 56, appellant relies on the same arguments made with respect to the same and similar claim language that appears in appealed claim 53 and other claims (brief, pages 16 and 19-20; reply brief, pages 11 and 14-15). Thus, we decide this appeal based on appealed claims 43 and 47 with respect to the first ground of rejection, and on appealed claim 53 with respect to the second ground of rejection. 37 CFR § 1.192(c)(7) (2002).

We affirm.

Rather than reiterate the respective positions advanced by the examiner and appellant, we refer to the examiner's answer and to appellant's brief and reply brief for a complete exposition thereof.

Opinion

We have carefully reviewed the record on this appeal and based thereon find ourselves in agreement with the supported finding advanced by the examiner that as a matter of fact, *prima facie*, appealed claims 43 and 47 are anticipated by Rigali (answer, page 5). Based on our review, we further are in agreement with the supported conclusion advanced by the examiner that as a matter of law, *prima facie*, one of ordinary skill in this art would have found in the combined teachings of Rigali and Ito the reasonable suggestion to modify the apparatus of Rigali by adding thereto a heat source in a plasma processing apparatus as required by appealed claim 53 in the reasonable expectation of controlling the temperature of a workpiece (answer, page 6).

Accordingly, since a *prima facie* case of anticipation has been established over Rigali with respect to appealed claims 43 and 47, and a *prima facie* case of obviousness has been established over the combined teachings of Rigali and Ito with respect to appealed claim 53, we have again evaluated all of the evidence of anticipation and non-anticipation and all of the evidence of obviousness and nonobviousness based on the record as a whole, giving due consideration to the weight of appellant's arguments in the brief and reply brief. *See generally*,

In re Spada, 911 F.2d 705, 707 n.3, 15 USPQ2d 1655, 1657 n.3 (Fed. Cir. 1990); *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984).

With respect to several issues raised by appellant, we interpret appealed claims 43, 47 and 53 mindful that we must give the language thereof the broadest reasonable interpretation in light of the written description in appellant's specification as it would be interpreted by one of ordinary skill in this art. *See, e.g., In re Thrift*, 298 F.3d 1357, 1364, 63 USPQ2d 2002, 2006 (Fed. Cir. 2002); *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). In doing so, we will not read any limitations of the specification, or any preferred embodiment or example therein, into the claim unless there is basis in the claim or specification to do so. *See generally, Morris, supra; Zletz, supra; In re Priest*, 582 F.2d 33, 37, 199 USPQ 11, 15 (CCPA 1978); *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969). When the specification does not contain an express definition, a reasonable, supported interpretation of the appealed claims that differs from that urged by appellant can be used to determine the patentability of the claims. *Morris*, 127 F.3d at 1055-56, 44 USPQ2d at 1028-30 ("Absent an express definition in their specification, the fact that appellants can point to definitions or usages that conform to their interpretation does not make the PTO's definition unreasonable when the PTO can point to other sources that support its interpretation."). Thus, "[i]t is the applicants' burden to precisely define the invention, not the PTO's. See 35 U.S.C. § 112 ¶ 2 [statute omitted]." *Morris*, 127 F.3d at 1055-56, 44 USPQ2d at 1029.

Appellant submits several arguments on the basis that Rigali does not disclose plasma treating "an encapsulated object" workpiece by a plasma treating apparatus which has a structure that satisfies the claim limitations with respect to "an enclosure" as required by appealed claim 43 (brief, e.g., pages 6, 7 and 11; reply brief, e.g., pages 2, 5 and 6). The involved limitations are "an encapsulated object," "an enclosure for housing an encapsulated object" and "a source of plasma gas, coupled to said enclosure, for exposing the encapsulated object in said enclosure to plasma gas."

We find that the term "encapsulated object" can be reasonably interpreted in light of the

written description in the specification to include any object that is encapsulated by a material such as a plastic. Thus, in giving the term the broadest reasonable interpretation, it encompasses at least molded plastic casing **30** on integrated chip **20** on lead frame **10** as seen in specification prior art **Figs. 1** and **2** (specification, page 3, lines 5-17). Such constructs can be referred to as a “package,” “plastic package” or “encapsulated package” as known in the prior art as acknowledged by appellant:

Semiconductor integrated circuits (ICs) (or “chips”) are typically housed in an encasing referred to as a “package.” The package typically includes a “lead frame” that is electrically connected to the IC within the package, and extends outward to allow electrical connection of the IC to a circuit board or other product. One of the most popular package types used in the art is known as the “epoxy molding” or “plastic” package. With this type of package, the IC and lead frame are enclosed or encapsulated by a plastic resin material that serves to protect the chip from moisture, contamination, and other physical or environmental conditions. [Specification, page 1, line 10, to page 2, line 2.

See also specification, e.g., page 2, line 3, to page 4, line 9; page 5, line 18, to page 6, line 2; page 8, line 13, to page 9, line 3; and page 12, lines 9-10.

Appellant agrees with the examiner (*see* answer, pages 6-7) that the other claim limitations do not require magazine **50** as described in **Fig. 5a** and page 11 of the specification as contended in the brief (page 6), but argues that “[t]he claims . . . require an enclosure (e.g., magazine or other housing structure) that both ‘hous[es] an encapsulated object’ and also permits ‘exposing the encapsulated object in said enclosure to plasma gas’ as recited” (reply brief, page 3; emphasis in original deleted).

We find that while “an enclosure” must function as specified in appealed claim 43 as appellant argues, we do not adopt the connotation of the term “housing” with respect to “an enclosure” implied in appellant’s argument. Indeed, it is not at all apparent from the written description in the specification that the term “an enclosure” is limited to a structure that “houses” the encapsulated object *and* resides *inside* a reaction chamber, as required by appellant’s argument, and we find no basis in the claim language or in the written description to read such a limitation into the claim. The specification does state that “[a]s shown in Fig. 5a, a plurality of encapsulated packages 52 may be arrayed into a plurality of storage units 54 (e.g., shelves), all *housed* in a magazine 50” which contains vent holes 56 to permit plasma gas to react with the

encapsulated object (page 12, lines 9-12; emphasis supplied). However, it further states in this respect, that “the reaction chamber 58 may *house* a plurality of magazines 50” (*id.*, lines 16-19; emphasis supplied). The term “house” is further used in the written description in connection with a “reaction chamber.” “[i]n a preferred embodiment, a plasma cleaner is provided with a reaction chamber used to *house* the devices during a deflashing procedure” (page 6, lines 2-5; emphasis supplied); and, “[t]he plasma chamber includes a process chamber 44 (also referred to as a ‘reaction chamber’) used to temporarily *house* one or more semiconductor packages, represented in Fig. 4 as lead frame 10 and casing 30, during the deflashing procedure” (page 9, lines 13-17; emphasis supplied). It is apparent that in disclosure accompanying these passages, a plasma gas source is “coupled” to the reaction chamber or “enclosure” as specified in appealed claim 43 (e.g., page 6, lines 5-7, and page 9, lines 17-20).

We further find that while the claim language “an enclosure for housing an encapsulated object” does not limit the manner in which the encapsulated object is housed in the enclosure, the language in the preamble and the last clause of appealed claim 43 specify that at least one component surface of the encapsulated object is subjected to the plasma gas such that any contaminants contained thereon are removed. Thus, the “enclosure” of the claimed apparatus must be capable of housing an encapsulated object in such manner that at least one component surface of the encapsulated object is exposed to the plasma gas. We find here that on this record, the preambular language does not otherwise limit the claimed apparatus. *See In re Stencel*, 828 F.2d 751, 754-55, 4 USPQ2d 1071, 1073 (Fed. Cir. 1987), and cases cited therein (“Whether a [statement] . . . of intended purpose constitutes a limitation to the claims is, as has long been established, a matter to be determined on the facts of each case in view of the claimed invention as a whole.”).

Thus, the broadest reasonable interpretation of the claim language involving “an enclosure” in light of the specification, encompasses within its scope a reaction chamber which houses an encapsulated object in any manner such that at least one of its surfaces is exposed to plasma gas from a source coupled to the enclosure.²

² We note here with respect to several of the examiner’s arguments regarding alleged process language and intended use language in the appealed claims (answer, e.g., pages 5 and 7-8), that it

The examiner finds that Rigali meets the limitations of, *inter alia*, appealed claim 43, because it shows, *inter alia*, “an enclosure chamber 16” and a “gas source 30,” and that “the apparatus of Rigali comprises an enclosure capable of housing an encapsulated object” (answer, pages 5 and 8). We find that Rigali discloses to one skilled in the art in the first embodiment, the plasma treatment apparatus **10** in **Figs. 1** and **3** which includes as one major component, “reaction chamber assembly **12** comprised of an outer shell or housing **18** which contains a reaction chamber shell **20**” that along with door **22**, provide reaction chamber **16** (col. 6, lines 26-48). Rigali further discloses “gas source **30** from which suitable processing gas may be injected into reaction chamber **16**” (col. 6, lines 58-60; *see also* col. 10, lines 61-67), and one skilled in the art would have recognized from **Fig. 1** that conduit **30'** couples gas source **30** with plasma treatment apparatus **10** and thus with reaction chamber **16** (col. 6, lines 58-60, and col. 10, lines 61-67). As seen in Rigali **Fig. 3**, the workpieces **100** are exposed to plasma gas in processing gap **140** between magazines **92** and **94** in reaction chamber **16** (e.g., col. 8, lines 36-56, col. 10, lines 29-38 and col. 11, lines 1-26).

We find that Rigali discloses “workpieces **100**, e.g., leadframes” (col. 10, lines 37-38; emphasis supplied), but other than thus citing “leadframes” as an example, merely refers to “workpiece magazines **92** and **94**” and to “workpieces **100**” (e.g., col. 8, line 37) in disclosing the first embodiment. With respect to workpiece magazines **92** and **94**, Rigali describes the same as “standard workpiece magazines . . . very widely used and well known in the integrated circuit industry” (col. 8, lines 11-15). Indeed, Rigali generically describes the workpieces and magazines therefor used in the apparatus (cols. 2-4). In this respect, Rigali describes plasma treatment apparatus **10** in the first embodiment as containing many parts and subsystems that “are substantially identical to the corresponding parts and subsystems of the PX series Plasma

is well settled that “[t]here is nothing intrinsically wrong in defining something by what it does rather than by what it is.” *See generally, In re Echerd*, 471 F.2d 632, 634-35, 176 USPQ 321, 322 (CCPA 1973); *In re Ludtke*, 441 F.2d 660, 663-64, 169 USPQ 563, 565-67 (CCPA 1971); *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971). In this respect, it is appropriate to determine whether the functional, “what it does” claim language confers a structural limitation, as in *Echerd*, *Ludtke* and *Swinehart*, or conveys a method or intended use concept. *See, e.g., In re Yanish*, 477 F.2d 958, 959, 177 USPQ 705, 706 (CCPA 1973); *In re*

Cleaning Systems” (col. 6, lines 14-20; see also col. 7, lines 53-58). Rigali discloses that the “PX series Plasma Cleaning Systems are batch processing apparatuses the reaction chambers of which are adapted to contain plural workpiece magazines, each . . . containing a plurality of workpieces or integrally joined workpiece sets, e.g., leadframes” (col. 2, lines 20-29), and acknowledges that

[t]ypical workpieces which are treated by these PX series Plasma Cleaning Systems are hybrid integrated circuits, leadframes, multi-chip modules, medical and electronic devices, optical devices, plastic parts where bonding is required, flat panel image displays, and parts, components, and substrates thereof. [Col. 1, lines 25-30.]

Thus, we find that one skilled in the art would have reasonably inferred from Rigali that workpieces **100** which can be processed in plasma treatment apparatus **10** of the first embodiment are the typical workpieces disclosed to be used with the PX series Plasma Cleaning Systems. *See In re Preda*, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968) (“[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom. [Citation omitted.]”). We further find that one skilled in the art would have known that such typical workpieces would include the typical, “most popular” encapsulated integrated circuits combined with lead frames, termed as “package,” “plastic package,” etc., as acknowledged by appellant in the specification, as we discuss above (*see* p. 5).

In view of these facts, we are of the opinion that the examiner’s finding that the claim limitations at issue here are met in fact by the plasma treatment apparatus **10** of the first embodiment of Rigali is supported by substantial evidence because the reference discloses that reaction chamber **16** houses workpieces **100** and has a source of plasma gas **30** coupled thereto through conduit **30’**, to which workpieces **100** are exposed in processing gap **140** between magazines **92** and **94** therein. In this respect, we are further of the opinion that the examiner’s finding in the answer (page 8) that one skilled in the art would recognize that the plasma treatment apparatus **10** of the first embodiment of Rigali is capable of housing and treating encapsulated objects as workpieces **100** is supported by substantial evidence, because one skilled

Casey, 370 F.2d 576, 579-80, 152 USPQ 235, 237-39 (CCPA 1967); *In re Otto*, 312 F.2d 937, 939-40, 136 USPQ 458, 459-60 (CCPA 1963).

in this art armed with the knowledge in the art would have reasonably inferred from the disclosure of Rigali that typical workpieces that can be processed in plasma treatment apparatus **10** include the typical, most popular encapsulated integrated circuits on a lead frame package acknowledged by appellant. *See In re Graves*, 69 F.3d 1147, 1152, 36 USPQ2d 1697, 1701 (Fed. Cir. 1995), and cases cited therein (“[A] skilled artisan could take [the reference’s] teachings in combination with his own knowledge and be in possession of the [claimed] device.”); *Preda, supra*.

Therefore, on this record, we determine that contrary to appellant’s arguments (brief, pages 7-14; reply brief, pages 3-8), Rigali in fact anticipates the claimed apparatus of appealed claim 43 without ignoring or disregarding any claim limitations.

Even so, the knowledge of one skilled in the art of the typical, most popular encapsulated integrated circuit on a lead frame package notwithstanding, the recitation in appealed claim 43 of “an encapsulated object” in the preamble and as an element does not serve to patentably distinguish the claimed plasma treating apparatus from the plasma treating apparatus disclosed by Rigali because on this record, neither the intended use recited in the preamble, *see generally, Yanish, supra; Casey, supra; Otto, supra*, nor the recited element *per se* in fact structurally limits the claimed apparatus in this respect. *See generally, Otto, supra; In re Young*, 75 F.2d 996, 25 USPQ 69 (CCPA 1935); *In re Rishoi*, 197 F.2d 342, 344-45, 9 USPQ 71, 72-73 (CCPA 1935); *cf. Ex parte Masham*, 2 USPQ2d 1647, 1648 (Bd. Pat. App. & Int. 1987). Indeed, we found above that in light of the written description in the specification, claim 43 requires that “an encapsulated object” is housed in a reaction chamber enclosure in *any* manner that permits the exposure of at least one surface thereof to plasma gas.

We are not persuaded otherwise in this case by appellant’s arguments with respect to *Rishoi*, on which the examiner relies, *Morgan Envelope Co. v. Albany Paper Co.*, 152 U.S. 425 (1894), and *In re Hughes*, 49 F.2d 478, 9 USPQ 223 (CCPA 1931), cited in *Rishoi*, and *Ex parte Muzquiz*, Appeal 1998-3425, 1998 WL 1736229 (Bd. Pat. App. & Int. 1998) (brief, pages 11-12; reply brief, pages 6-7). Appellant submits that neither *Rishoi* nor *Morgan Envelope* or *Hughes* cited thereon, “ruled on the issue with respect to an invention in which an apparatus was purposely limited to a combination of elements (i.e., including a work piece as an express

element of the claims)” (brief, page 11; emphasis in original deleted). We do not agree with appellant’s position with respect to *Roshoi*.

In *Roshoi*, appealed claim 10 was drawn to “[a] device for use as a churn and butterworker comprising” a drum having a roughened surface “and a film of liquid covering exposed portions of said” surface “whereby a butter contacting surface is secured which surface when moistened will not readily adhere to butter.” 197 F.2d at 342, 9 USPQ at 71. The predecessor court to our reviewing court stated:

Counsel for appellants, in their contention that the involved claims define a new and novel structure, include the film of liquid which covers the exposed portion of the particles [of the roughened surface] and therefore argue that a new structure is formed by reason of the presence of this liquid film as one of the elements of the structure.

We agree with the reasoning of the board that the liquid film is not a structural limitation and therefore cannot impart patentability to those claims which are otherwise unpatentable. In our opinion there is no patentable combination between a device and the material on which upon which it works. [Citation of *Morgan Envelope, supra*, and *Hughes, supra*, omitted.]

It is clear that when the structure is completed there is no liquid therein and also after the operation of the butter working is over the film of liquid will evaporate and disappear. . . . [197 F.2d at 344, 9 USPQ at 73.]

We are of the view that the precedential decision in *Rishoi* makes clear that the “liquid covering the exposed” surface is derived from the material on which the apparatus was intended to work and disappears when the processed material is removed from the apparatus, and thus, serves as no structural limitation on and forms no patentable combination with the apparatus. Therefore, contrary to appellant’s arguments, the court in *Rishoi* did consider a claim in which an apparatus was purposely combined with the work piece. Binding precedent to the contrary is not found in *Morgan Envelope* as appellant contends, because, as appellant admits, the Supreme Court in that case did not rule on the issue. Appellant advances no separate argument in support of the contention that *Hughes*, earlier decided by the *Rishoi* court, is improperly relied on by that court in *Rishoi*.

The examiner did cite, *inter alia*, *Young, supra* (answer, page 9). In this precedential decision, the predecessor court to our reviewing court squarely considered in appealed claim 6 “a machine for making concrete beams” having in combination, “concrete reinforced structures with

longitudinal members connected by cross bars supported by suitable chairs on the said palette.” 75 F.2d at 997, 25 USPQ at 70. The court stated that “claim 6 . . . does include as an element the material being worked upon,” holding that “its inclusion may not lend patentability since the claim is not otherwise allowable.” 75 F.2d at 998, 25 USPQ at 71. We note here that in the precedential decision in *Otto, supra*, the predecessor court to our reviewing court considered appealed claim 1 drawn to an “article of manufacture, a core member for hair curlers comprising a body of elastically resilient foam material, the hair being wound directly on said body and said body carrying a hair weaving lotion,” noting that “[i]n use, the core member may have the tresses of hair wound on it while the core and the hair are both dry” with lotion subsequently applied and forced into the core. 312 F.2d at 938, 136 USPQ at 458. The court held that “[i]t seems appellants are endeavoring to predicate patentability upon a certain procedure for curling hair using this device . . . [and] [t]his process is irrelevant as is the recitation involving the hair being wound around the core insofar as the determination of whether these particular claims should be allowed or rejected,” citing in this respect, *inter alia*, *Roshoi* and *Young* for the proposition “that the inclusion of the material or article worked upon by a structure being claimed does not impart patentability to the claims.” 312 F.2d at 939, 136 USPQ at 459.

We are also not persuaded by appellant’s arguments based on *Muzquiz* (brief, pages 12-13; reply brief, pages 7-8), a non-precedential decision of this Board. It is apparent that in the passage cited by appellant (brief, page 13), the prior panel expressed the opinion that “the claimed subject matter is a combination wherein a *specific form* of dispenser and a *specific form* of polyethylene bags on a roll are set forth together as defining” the claimed invention (slip opinion, page 7; underline emphasis in original; italics emphasis supplied). Indeed, it is apparent from the opinion that the prior panel found that the appealed claims required that the bags must be of a certain structure to conform to the structure of the dispenser (slip opinion, page 6). On this basis, the prior panel did not agree with the examiner that *Masham, supra*, also a non-precedential decision of this Board, pertained to the facts of the case without discussion (slip opinion, pages 7-8).

The facts of record before us are more akin to the authority that we rely on above and to which we compare *Masham*. Indeed, in the same manner as in *Rishoi*, *Otto*, and *Young*, as well

as in *Masham*, and contrary to the facts before the panel in *Muzquiz*, here appealed claim 43 does not require any structural specificity with respect to either “an encapsulated object,” or the manner in which it is housed in “an enclosure” such that at least one surface of thereof is exposed to plasma gas. As the examiner argues, “there is no structural difference [between the claim apparatus and that of Rigali] as a result of the encapsulated object being processed in the apparatus” (answer, pages 9-10).

Therefore, in the same manner as in the authority on which we rely, the claimed apparatus of appealed claim 43 is complete without “an encapsulated object,” and accordingly, upon consideration of the claimed invention as a whole as encompassed by appealed claim 43 and in light of the written description in the specification, the claimed apparatus does not patentably distinguish over Rigali by reason of the presence of “an encapsulated object” upon which it works.

Appellant relies on the same arguments with respect to the same and similar claim language that appears in appealed claim 47 (brief, page 14; reply brief, page 8) that we considered above. Of the additional claim language appearing in claim 47, appellant focuses on “a vacuum pump coupled to said reaction chamber, wherein said vacuum pump maintains vacuum pressure in said reaction chamber and removes by-products produced from reaction on a surface of the encapsulated electronic component of gas,” and submits that Rigali only discloses the use of a vacuum pump to maintain pressure in the reaction chamber, citing col. 10, lines 59-60, and there is “no ‘anticipatory’ disclosure of the claimed ‘removal’ limitations” (brief, page 15).

The examiner contends that inherently, a vacuum pump removes by-products along with other gases in maintaining the reaction chamber at a specific pressure, and because the vacuum pump used by Rigali is capable of performing the uses intended for such pump in appealed claim 47, “there is no structural limitation in the vacuum pump that differentiates the claimed vacuum pump from the vacuum pump used in the Rigali apparatus” (answer, pages 10-11).

Appellant responds that the examiner has not carried the burden of establishing by fact and technical reasoning that the inherent removal of by-products naturally reasonably necessarily flows from the description of the operation of vacuum pump **28** in Rigali, contending that “[i]f

the vacuum pump of Rigali was actually used to perform the missing ‘removing by-products’ limitation . . . it must necessarily be operating continually to maintain pressure of 50 to 80 mTORR, as described in Rigali” (reply brief, page 9; emphasis in original deleted). Appellant alleges that Rigali uses gas source **30** to maintain reaction chamber 16 at a partial pressure between 100mTORR and 1.2 TORR, citing col. 10, lines 61-67, and thus, “[i]f the vacuum pump had been continually operating . . . the processing gas would never reach it’s operating pressure (*id.*, pages 9-10; emphasis in original deleted). Appellant further alleges that the venting of injected gas to the atmosphere and purging the reaction chamber with nitrogen gas taught by Rigali at col. 11, lines 27-33, would not be necessary if “the vacuum pump [had] been operating to necessarily perform the ‘removing’ function” (*id.*, page 10). Appellant argues that if such discrepancies do not show that the pump does not function to remove by-products, “they establish an ambiguity” which is not sufficient to establish inherency.

We find no requirement in the cited language of appealed claim 47 that the vacuum pump must operate *continuously* to “removes by-products” and, indeed, in the specification Example which illustrates a *batch* process, “[a] vacuum is applied to maintain the pressure between 300 mTORR – 1 TORR. The plasma gas and vacuum are applied between 5 and 20 minutes of the 4 hour period” in which the workpieces are in the reaction chamber (page 13, lines 2-15). It further appears that the use of a vacuum pump to produce the vacuum is optional (col. 13, lines 29-30). In similar manner, the written description in the specification further discloses “[a] vacuum pump 42, which maintains the pressure inside the process chamber 44 (usually run at pressures of 150 millitorr to 1500 millitorr), may be included in the plasma cleaner to remove the contaminant by-products” (page 12, lines 1-4).

Thus, we interpret appealed claim 47 in light of the specification to specify that the vacuum pump must be capable of removing at least some amount of by-products, however small, within any TORR pressure range.

We find that Rigali discloses that vacuum pump **28** of the *batch* processing apparatus can be a commercially available, two stage pump (col. 6, lines 12 and 54-56), which when operated along with the rest of the apparatus as illustrated by Rigali (col. 10, line 45, to col. 11, line 40, particularly col. 10, lines 58-60), evacuates the reaction chamber within a *lower* TORR pressure

range than unidentified vacuum pumps which perform within the TORR pressure ranges stated in the passages in the written description in the specification we discuss above. Thus, the vacuum pump described by Rigali would be capable of performing in the TORR pressure ranges disclosed by appellant in the specification.

Therefore, we find that it reasonably appears from this evidence that the examiner correctly found that the vacuum pump in the apparatus of Rigali would necessarily inherently be capable of removing at least some amount, however small, of by-products from the reaction chamber as required by appealed claim 47 as we interpreted this claim above, even though, as appellant points out, this claimed function for the vacuum pump is not described by Rigali. Accordingly, the burden has shifted to appellant to establish by effective argument or objective evidence that the vacuum pump described by Rigali cannot perform the function of removing some amount, however small, of by-products from the reaction chamber as specified in appealed claim 47 in order to patentably distinguish the claimed apparatus over that disclosed in the first embodiment of Rigali under § 102(e). Appellant's mere arguments that Rigali does not describe the function of removing by-product from the reaction chamber fails to convince us that, on the facts discussed above, the vacuum pump described by Rigali is inherently incapable of the function set forth in the claim. *See generally, In re Glass*, 474 F.2d 1015, 1019, 176 USPQ 529, 532 (CCPA 1973); *Ludtke*, 441 F.2d at 663, 169 USPQ at 566.

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of anticipation found in Rigali with appellant's countervailing evidence of and argument for no anticipation in fact and find that the claimed invention encompassed by appealed claims 43, 44, 46 through 52, 58 and 59 is anticipated as a matter of fact under 35 U.S.C. § 102(b).

Turning now to the grounds of rejection under § 103(a), appellant's arguments focus on the following limitation in appealed claim 53: "a heat source providing heat inside said process unit to cure the electronic packages." Appellant submits that "the examiner does not identify any disclosure (or suggestion) in Ito that meets the 'curing' functional limitation claimed" (brief, page 17; emphasis in original deleted). Appellant further argues that there is no motivation or suggestion to combine Rigali and Ito because Rigali is drawn to a system of cleaning work

pieces, and Ito is directed to improving conventional wafer deposition processes by the addition of radiators to heat the wafers to facilitate the deposition, citing col. 3, lines 8-53 (brief, pages 18-19).

The examiner contends that “there is no structural limitation that differentiates the claimed heat source from the heat source used in the apparatus of Rigali modified by” Ito, and the heater disclosed by the latter “reference is capable of curing substrates, including the claimed electronic packages” (answer, pages 11-12). The examiner further contends that one of ordinary skill in the art would have combined the references because Ito discloses that a source of heat “is suitable for substrate temperature control in a plasma processing apparatus,” and “that through the knowledge generally available to one of ordinary skill in the art, it is known that the combination of a heating treatment in a plasma environment increases the process rate . . . and provides a more uniform treatment of the substrates” (answer, pages 12-13).

Appellant maintains that one of ordinary skill in the art would not combine Rigali with Ito, arguing that the examiner’s reliance on “knowledge generally available to one of ordinary skill in the art” is not supported by evidence of record (reply brief, pages 11-14).

We find that the written description in the specification with respect to the claim language at issue here, is set forth at page 16:

[I]n another preferred embodiment, the plasma clean step 76 and cure step 78 are implemented simultaneously using the same chamber. As shown in Fig. 5b, the plasma cleaner can be modified to add a source of heat 59 to provide the heat necessary to cure the molded package directly in the reaction chamber 58. The heat output from the source 59 may be supplied to reaction chamber 58 in any manner known in the art. [Lines 11-19; see also page 19, lines 8-11.]

We note again here that according to the specification, an “electronic package” as used in appealed claim 53 is another name for “encapsulated package” or “encapsulated object” such as a plastic encapsulated object or package (*see above* p. 5).

Thus, we interpret appealed claim 53 in light of the specification to include within its scope, an apparatus which comprises at least a process unit of any design in which a plurality of plastic encapsulated electronic packages or objects are disposed for treatment by plasma gas and curing, that has therein a heat source of any design which provides sufficient heat to cure the plurality of plastic encapsulated electronic packages or objects.

We find that Ito is directed to an “apparatus for gas phase treating substrates, in particular, . . . a large number of substrates in a single operation” (col. 1, lines 7-10, and col. 1, line 67, to col. 2, line 2). Ito acknowledges that in the prior art, resistance heaters or the like heat the substrates to a reaction temperature and then plasma gas entering at one end of the reactor treats the heated substrate, and thus finds that substrates located at different distances from the plasma gas inlet “makes it difficult to supply active reaction seeds uniformly to all substrates,” such that “a large number of substrates cannot be treated in a single operation” (col. 1, lines 20-35; see also col. 1, lines 42-50). Ito’s solution is to form the plasma gas in the batch reactor and to heat a radiator surrounding the substrate by high frequency power supply means, such that the plasma gas is formed near each of the substrates, which can be arranged in parallel and very close to each other, thus resulting in uniformly treating a large number of substrates in a single batch operation (col. 2, lines 3-31). In an embodiment, “heat is radiated to heat silicon wafers **101** to a temperature of about 1000°C. at their centers,” which is “as uniform as when heated by a conventional electrical resistance heater” (col. 3, lines 35-41). Ito states that the methods and apparatuses can be used for different plasma treatments, wherein the “radiators heated by a high frequency power supply means and for heating wafers may be provided either outside the reaction tube or inside a reaction tube,” with either arrangement providing “uniform treatment of a large number of wafers in a single operation” (col. 5, lines 3-35).

We determine that contrary to appellant’s arguments, the disclosure of Ito taken with the disclosure of Rigali provides substantial evidence supporting the examiner’s position that one of ordinary skill in this art would have modified the apparatus of Rigali by adding radiators heated by high frequency power supply means, such as an energy field generator, inside the process unit as suggested by Ito, in the reasonable expectation of providing temperature control in order to treat a large number of substrates in a *batch* operation, the heat generated being sufficient to cure plastic encapsulated electronic packages when used as the substrate. Indeed, in view of the disclosure in Ito that the apparatus and methods disclosed therein are applicable to plasma processing generally as the examiner points out, we also cannot agree with appellant’s argument that the references are not combinable because of differences in the plasma treatment described in the preferred embodiments. Furthermore, we agree with the examiner that the apparatus of

Rigali modified by the teachings of Ito would have been capable of curing plastic encapsulated electronic packages because Ito does disclose an embodiment in which the substrate is heated to a temperature of 1000°C. We find no evidence of record, including the passage from the specification we set forth above, that plastic encapsulated electronics packages would not be cured when heated to processing temperatures in the temperature ranges of plasma gas treatment methods disclosed in Ito. *See generally, Glass, supra; Ludtke, supra.* Moreover, we find adequate support for the examiner's statement of the knowledge generally available to one of ordinary skill in this art in col. 1 of Ito.

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in the combined teachings of Rigali and Ito with appellant's countervailing evidence of and argument for nonobviousness and conclude that the claimed invention encompassed by appealed claims 45, 53 through 57 and 60 through 62 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

The examiner's decision is affirmed.

Other Issues

While we have affirmed the decision of the examiner based on the disclosure in Rigali, we suggest that the examiner consider the following in the event of further prosecution of the appealed claims.

We referred above to the disclosure in Rigali of the "PX series Plasma Cleaning Systems" at, e.g., col. 6, lines 14-20 (*see pp. 7-8*). In this respect, Rigali states that "certain documents regularly supplied to purchasers of the PX series Plasma Cleaning Systems" are in the patent file as Appendices A through E of the specification (col. 6, lines 22-25). Upon review of these documents in the Rigali file, it appears to us that the disclosure therein reasonably pertains to the appealed claims.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

EDWARD C. KIMLIN
Administrative Patent Judge

CHARLES F. WARREN
Administrative Patent Judge

TERRY J. OWENS
Administrative Patent Judge

BOARD OF PATENT APPEALS AND INTERFERENCES

Appeal No. 2003-1501
Application 09/756,929

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